Whence may be drawn an evident Corralary; that the safest of all Arches is the Semicircular, and of all Vaults the Hemisphere, though not absolutely exempted from some natural Weakness,† as Barnardino Baldi, Abbot of Guastalla, in his Commentary upon *Aristotle's Mechanicks*, doth very well prove; where let me note by the way, that when any thing is mathematically demonstrated weak, it is much more mechanically weak, Errors ever occurring more easily in the management of gross Materials, than lineal Designs.

THEOREM V.

As Semicircular Arches, or Hemispherical Vaults, being raised upon the total Diameter, be of all other the roundest and, consequently, the securest by the precedent Theorem; so those are the gracefullest, which keeping precisely the same Height, shall yet be distended one fourteenth Part longer than the said entire Diameter; which Addition of Distent will confer much to their Beauty, and detract but little from their Strength.

This Observation I find in Leon Baptista Alberti; but the Practice how to preserve the same Height, and yet distend the Arms or Ends of the Arch, is in Alberti Durer's Geometry, who taught the Italians many an excellent Line, of great use in this Art.

Upon these five Theorems all the Skill of Arching and Vaulting is grounded: As for those Arches which our Artizans call of the third and fourth Point, and the Tuscan Writers *di terzo* and *di quarto acuto;* because they always concur in an acute Angle, and do spring from Division of the Diameter, into three, four, or more Parts at pleasure; I say, such as these both from the natural Imbecility of the sharp Angle itself, and likewise for their very Uncomeliness, ought to be exiled from judicious Eyes, and left to their first inventors, the Goths or Lombards, amongst other Reliques of that barbarous Age.

Thus of my first Partition of the Parts of every Fabrick into five Heads, having gone through the two former, and been incidentally carried into this last Doctrine touching Arches and Vaults. The next now in order are the Apertions, under which Term I do comprehend Doors, Windows, Stair Cases, Chimnies, or other Conducts; in short, all Inlets or Outlets, to which belong two general Cautions.

First, That they be as few in Number, and as moderate in Dimension, as may possibly consist with other due Respects; for in a word, all Openings are Weakenings.

Secondly, That they do not approach too near the Angles of the Walls; for it were indeed a most essential Solecism to weaken that Part which must strengthen all the rest: A Precept well recorded, but ill practised by the Italians themselves, particularly at Venice, where I have observed diverse *Pergoli*, or *Menianæ* (as Vitruvius seemeth to call them, which are certain ballised Outstandings to satisfy Curiosity of Sight) very dangerously set forth upon the very Point itself of the Mural Angle.

Now, albeit I make haste to the casting and comparting of the whole Work (being indeed the very definitive Sum of this Art, to distribute usefully and gracefully a well chosen Plot) yet I will first under their several Heads, collect briefly some of the choicest Notes belonging to these particular Overtures.

Of Doors and Windows.

These Inlets of Men and of Light I couple together, because I find their due Dimensions brought under one rule, by Leon Alberti (a learned Searcher), who from the School of Pythagoras (where it was a fundamental Maxim, That the Images of all Things are latent in Numbers) doth determine the comliest Proportion between Breadths and Heights, reducing Symmetry to Symphony, and the Harmony of Sound, to a kind of Harmony in Sight, after this manner: The two principal Consonances that most ravish the Ear are, by consent of all nature, the *Fifth* and the *Octave;* whereof the first riseth radically, from the Proportion between two and three. The other from the double Interval, between one and two, or between two and four, &c. Now, if we shall transport these Proportions from audible to visible Objects, and apply them as they shall fall fittest (the Nature of the Place considered), namely in some Windows and Doors, the Symmetry of two to three in their Breadth and Length, in others, the double, as aforesaid, there will indubitably result from either a graceful and harmonious Contentment to the Eye; which Speculation, though it may appear unto vulgar Artizans, perhaps, too subtile and too sublime, yet we must remember that Vitruvius himself doth determine many Things in his Profession by Musical Grounds, and much commendeth in an *Architect*, a Philosophical Spirit; that is, he would have him (as I conceive it) to be no superficial and floating Artificer, but a Diver into Causes, and into the Mysteries of Proportion. Of the Ornaments belonging both to Doors and Windows, I shall speak in another Place; but let me here add one Observation, That our Master (as appeareth by diverse Passages, and particularly, Lib. 6, Cap. 9.) seems to have been an extream Lover of luminous Rooms: And indeed, I must confess, that a frank Light can misbecome no Edifice whatsoever, Temples only excepted, which were anciently dark, as they are likewise at this Day in some Proportion; Devotion more requiring collected than diffused Spirits.* Yet on the other side, we must take heed to make a House (though but for civil use) all Eyes, like Argus, which in Northern Climes would be too cold, in Southern too hot: and therefore the Matter indeed importeth more than a merry Comparison. Besides, there is no part of Structure either more expenceful than Windows, or more ruinous, not only for that vulgar Reason, as being exposed to all Violence of Weather, but because consisting of so different and unsociable Pieces, as Wood, Iron, Lead, and Glass, and those small and weak, they are easily shaken. I must likewise remember one Thing (though it be but a *Grammatical* Note) touching Doors; some were *Fores*, and some were *Valvæ;* those (as the very Word may seem to import) did open outwards, these inward; and were commonly of two Leaves or Panes (as we call them) thereby requiring indeed a lesser Circuit in their unfolding, and therefore much in Use among *Italians* at this Day: But I must charge them with an Imperfection, for though they let in as well as the former, yet they keep out worse.

Of Stair-Cases.

To make a compleat Stair-Case is a curious Piece of *Architecture:* The vulgar Cautions are these:

That it have a very liberal Light, against all Casualty of Slips and Falls.

That the Space above the Head be large and airy, which the *Italians* use to call *Un bel sfogolo*, as it were good Ventilation, because a Man doth spend much Breath in mounting.

That the half Paces be well distributed, at competent Distances, for reposing on the Way.

That to avoid Encounters, and besides to gratify the Beholder, the whole Stair-Case have no nigard Latitude, that is, for the principal Ascent, at least ten Foot in Royal Buildings.

That the Breadth of every single Step or Stair, be never less than one Foot, nor more than eighteen Inches.

That they exceed by no means half a Foot in their Height or Thickness, for our Legs do labour more in Elevation than in Distention: These, I say, are familiar Remembrances; to which let me add

That the Steps be laid where they join *Con un tantino di scarpa;* we may translate it somewhat sloping, that so the Foot may in a sort both ascend and descend together, which though observed by few, is a secret and delicate Deception of the Pains in mounting.

Lastly, To reduce this Doctrine to some natural, or at least mathematical Ground, our Master (as we see, Lib. 9. Cap. 2.) borroweth those Proportions that make the Sides of a rectangular Triangle, which the ancient School did express in lowest Terms, by the Numbers of Three, Four, and Five; that is, Three for the Perpendicular, from the Stair-Head to the Ground, Four for the Ground-Line itself, or Recession from the Wall; and Five for the whole Inclination or Slopeness in the Ascent; which Proportion, saith he, will make *Temperatas graduum liberationes*. Hitherto of Stair-Cases which are direct: There are likewise Spiral, or Cockle Stairs, either circular or oval, and sometimes running about a Pillar, sometimes vacant, wherein Palladio (a Man in this Point of singular Felicity) was wont to divide the Diameter of the first Sort into three Parts, yielding one to the Pillar, and two to the Steps: Of the second into four, whereof he gave two to the Stairs, and two to the Vacuity, which had all their Light from above; and this in exact Ovals, is a Masterpiece.

(To be continued.)

† Which is the sole Prerogative of Perpendicular Lines and Right Angles.

* Lumen est diffusum sui et alieni.

THE NATURE OF DESIGN.

A Paper read at the meetings of the Decorative Art Society, March 13th and 27th.

BY MR. CRABB, V.P., MEMBER OF THE INSTITUTE OF FINE ARTS.

(*Continued from p.* 411.)

Louis the XIV. was a magnificent patron of the arts, and also first instituted an academy in France, for the purpose of teaching art upon systematic principles, subdividing the instruction under the heads of drawing after the antique and after the living model, anatomy, painting, per-pective, the laws of taste, colouring, and composition. The plan of education previously pursued was that of apprenticeship, where the youth gradually learned the craft, assisted his master, and set up for himself; and in this manner the noblest artists had been produced. Notwithstanding the advantages which an academy presents in providing able teachers, and collecting the great examples of art, without the study of which the strongest intellect may be deviously employed, academies have never succeeded in sustaining a period of declining art: few are taught to much purpose, unless in a great measure their own teachers; and we find that art sunk rapidly after the time of Francis I.

It continued thus depreciated for nearly two centuries; and although many of the castle palaces of Germany were erected during that time, and commanded attention from their massive and often impressive grandeur, there is not that purity of style which will stand the test of time. Contemporaneous in England, the Elizabethan was paramount, and in the next age, a debased use of the style of Louis XIV. was the favourite. Beauties may be found in both; each is extremely picturesque, and when chosen with due regard to fitness of purpose, may be tolerated by the lover of fine art, and most assuredly will please the painter. The Italians, naturally a refined people, and accustomed to fine sculpture and painting in their churches, first returned to the right path; France and Germany have followed, and England has now the opportunity.

Throughout these remarks, as previously observed, I have purposely avoided noticing any definite characteristics of particular styles of embellishment: each requires to be considered separately, with its applicable value, leading features, and distinct principles of design.

I will now take a brief view of the means by which foreigners have rendered science and fine art so popular among their own people as to cause a constantly increasing demand for the application of beautiful form and rich embellishment to their manufactures, giving them the most decided superiority over the English in taste. Speaking of the continent generally, during the last century, universal attention has been paid to the subject, and in some kingdoms, as France, Prussia, and Bavaria, most extraordinary care has been taken to teach the *true principles of Design*.

In each town of any importance, a hall, with a collection of casts from the antique and most beautiful specimens of modern sculpture, was opened; a museum of general and natural history,—and, wherever it was possible, a small collection of paintings. This plan was found to have the happiest effect upon the people; they came in from the market-place, or their ordinary occupations, saw the most beautiful or instructive objects of art and nature, and insensibly formed to themselves a taste for fine art.

Drawing was taught as a part of the national education, and botanical information communicated sometimes through the means of grouping and common flowers. Dr. Ure mentions this to be an usual practice among the children of the silk weavers in the South of France. With so intimate an acquaintance with nature, can we be surprised at the excellence of their after-works? Does it not pre-

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